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THE GENERAL APTITUDE TEST BATTERY AS A PREDICTOR OF SUCCESS ON THE GENERAL EDUCATION DEVELOPMENT TEST

The University of Oklahoma PH.D. 1981

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GRADUATE COLLEGE

THE GENERAL APTITUDE TEST BATTERY AS A PREDICTOR OF SUCCESS ON THE GENERAL EDUCATION DEVELOPMENT TEST

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BY

SUZANNE MURPHY

Norman, Oklahoma

1981

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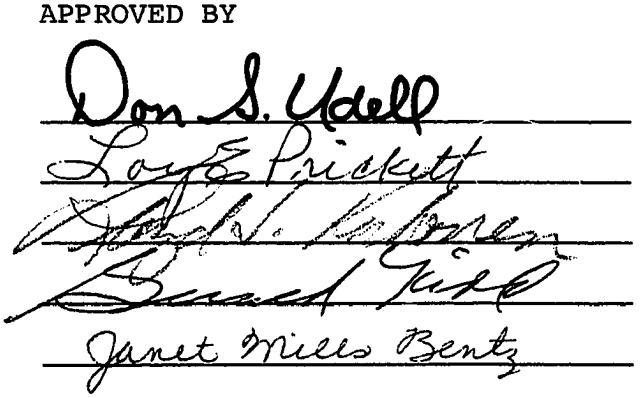
APPROVED BY



DISSERTATION COMMITTEE

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CHAPTER I

INTRODUCTION

Introductory Statement

A high school education has assumed great importance in recent years. Individuals with limited educational background are experiencing more and more difficulty securing employment, assuming greater responsibility and advancing in their jobs. As our society has become more complex, jobs have become more technical with higher educational requirements. The result is that the diploma or degree has become the price for admission to an increasing number of jobs. In past years, high school dropouts could achieve some measure of success in the world of work, but today they are experiencing difficulty in even securing satisfactory employment. In practice, dropouts from school are becoming dropouts from society unless they can secure some form of certification that qualifies them to work.

Census figures show that there are over forty-eight million Americans who have not completed four years of high school. (U.S. Bureau of the Census, 1979) In a study done by S. H. McDonald (1978), it was reported that the 1970 census showed the population of Oklahoma to be 2,559,175. Of this number, there were 687,292 people age twenty-five and older who had not completed twelve years of formal education. This represents 26.85 percent of the population of Oklahoma. The study further showed that there were 17,322 persons who had never attended school; 62,209 persons who had completed only one to four years of formal education; 149,973 persons who had completed five to seven years of formal education; 188,663 persons who had attained only an eighth grade education; and 269,125 persons who had completed one to three years of high school. (McDonald, 1978) See Table 1 below for summary.

TABLE 1

LEVEL OF EDUCATION FOR PERSONS TWENTY-FIVE YEARS OF AGE OR OLDER IN OKLAHOMA

LEVEL OF EDUCATION ATTAINED	MALES	FEMALES	TOTAL	% OF POP.
No formal education	9,474	7,848	17,322	.68
1st through 4th grade	35,997	26,212	62,209	2.43
5th through 7th grade	75,671	74,302	149,973	5.86
Only 8th grade	89,934	98,729	188,663	7.37
1 to 3 yrs. high school	114,317	154,808	269,125	10.51
TOTAL	325,393	361,899	687,292	26.85

Although these figures are over ten years old, they still show that there is a large number of individuals within the state of Oklahoma who have limited formal education.

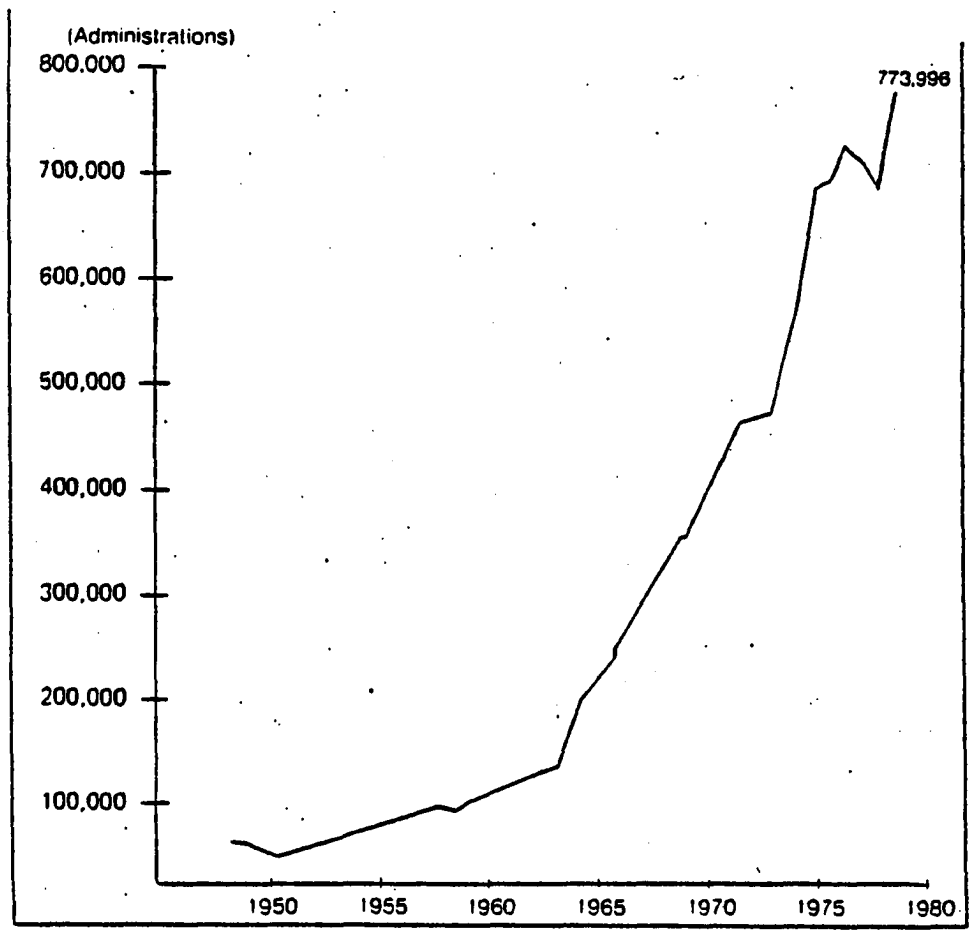
Adults who have not completed their high school education have an opportunity to get a high school equivalency certificate by taking the General Education Development Test. Developed in 1945 by the American Council on Education, the test was first given to veterans whose education had been interrupted by World War II. The purpose of the high school equivalency certificate is to establish that a person who has not finished high school has the educational background equal to that of a high school graduate. The certificate is recognized in business, government, civil service, industry, the armed services, vocational/technical schools and institutions of higher education.

Since 1945 the number of adults taking the General Education Development Test has increased steadily. See Figure 1. In 1979, there were 773,996 people in the United States who took the General Education Test. Of that number 608,229 met the requirements set by their state departments of education and were issued a high school equivalency certificate. From 1974 to 1979 there were 2,179,256 people who received certificates. Approximately 40.8 percent of the candidates indicated the examination was being taken for entrance into additional education or training programs. (The General Educational Development Testing Service of the American Council on Education, 1980)

FIGURE I

VOLUME OF GED TESTING IN THE UNITED STATES

1950 - 1979



SOURCE: The General Educational Development Testing Service of the American Council on Education, The GED Statistical Report, 1979, (Washington, D.C., 1980)

The General Education Development Statistical Report, 1979, showed that the average number of years of formal schooling for the General Education Development candidate was 10.0, and the average age of the candidates was 25.3 years. (The General Educational Development Testing Service of the American Council on Education, 1980) Many of these people required some type of preparatory instruction before taking the test. General Education Development preparation classes are offered by many institutions across the nation. Churches, public schools, and state agencies offer special classes for adults who want to study for the General Education Development Test. There are federal agencies such as the Department of Defense, the Department of Health, Education, and Welfare, and the Department of Labor that fund General Education Development preparation classes.

One example of a federally funded program is the General Education Development preparation classes sponsored by the Department of Labor through Oklahoma County CETA. The Comprehensive Employment and Training Act, first enacted in 1973, authorizes a combination of programs designed to provide specific employment and training services needed to prepare and place eligible individuals in unsubsidized employment. Since the lack of a high school diploma is a major stumbling block for entering unsubsidized employment, General Education Development preparation classes have been established for CETA participants.

Persons requesting assistance from CETA are first assessed in order to determine their eligibility. Those who are found to be eligible are tested so that an Employability Development Plan can be prepared. Part of the second assessment procedure is the administration of the General Aptitude Test Battery. This test measures nine different aptitudes and identifies specific job areas for which a client would be suited. When clients who are non-high school graduates are chosen for training in a field that requires a high school diploma or its equivalent, they are placed in a General Education Development preparation program.

Need For The Study

In 1978 the General Education Development Test underwent major changes in structure, content and format. The revision was released nationwide in January, 1978. No study was found in a review of the literature that explored the relationship of the General Aptitude Test Battery (GATB) scores with those of the revised General Education Development (GED) test. It would be helpful to know if the aptitudes measured by the GATB could be used to predict different subscores on the GED. It would also be informative to know if the total GED score could be predicted from the GATB. If some prediction could be made, then those participants who were predicted to get low scores on the GED could be channeled into other programs. Program planners and counselors would be able to

provide better services for their clients and would be able to improve the rate of completion for CETA participants.

If GATB scores could be used to predict the number of hours a client would need to participate in a General Education Development Program, it would be possible for counselors to smooth the transition from one training program to the next, eliminating the long waiting period that sometimes occurs.

Statement of the Problem

The purpose of this study is to determine the relationship between test scores on the General Aptitude Test Battery and scores on the General Education Development Test. More specifically

1. to determine regression equations that will predict subtests scores of the GED from GATB subtests scores;
2. to determine a regression equation that will predict the total GED score from subtests of the GATB;
3. to determine a regression equation that will predict from GATB scores the number of hours a student will need to participate in the GED preparation program.

Definition of Terms

The General Education Development Test

In this study the General Education Development Test has been referred to as the GED. The GED is a battery of five tests: Test 1, Writing Skills; Test 2, Social Studies; Test

3, Science; Test 4, Reading Skills; Test 5, Mathematics. Individuals who take the GED and have scores that meet the criteria determined by their state departments of education are eligible to receive a High School Equivalency Certificate. There is no national minimum score required for a high school equivalency certificate. Each state establishes its own minimum score requirements. See Appendix A for current state requirements.

Standard scores are used to report GED results. These are normalized scores with a mean of 50 and a standard deviation of 10. Standard scores range from 20 to 80 for each test in the battery. An average score is also reported which is determined by adding the five standard scores and dividing the total by five.

The General Aptitude Test Battery

In this study, the General Aptitude Test Battery has been referred to as the GATB. The GATB is a battery of tests that measures nine aptitudes. The test was developed by the United States Employment Service and is used extensively by state employment services, schools and other organizations authorized to use the GATB for counseling and research. Standard scores are used to report GATB results. These are normalized scores with a mean of 100 and a standard deviation of 20. Table 2 below shows the nine aptitudes measured by the GATB and the letter that is used to refer to these aptitudes.

Table 2

APTITUDES MEASURED BY THE GATB

Letter Used	Aptitude Measured
G	General Intelligence
V	Verbal Aptitude
N	Numerical Aptitude
S	Space Relations
P	Form Perception
Q	Clerical Perception
K	Motor Coordination
F	Finger Dexterity
M	Manual Dexterity

Limitations of the Study

The participants of this particular study were predominantly white females between the ages of 19 and 25. Results from this study may not be applicable to minority groups or males.

Basic Assumptions

It was assumed that the test scores used were reported correctly and were obtained under prescribed testing conditions; no participant had prior knowledge of test questions or answers before taking the tests.

Organization of the Study

This study has been divided into five parts. The first chapter is an introduction which outlines the need for

the study, states the problem, defines terms, discusses the limitations of the study, and finally points out the basic assumptions made for the study. The second chapter is a review of selected literature that was deemed relevant to this study. The third chapter explores the methodological procedures, instrumentation, and acquisition and treatment of the data. The fourth chapter gives the findings of the study. The fifth chapter summarizes the study giving conclusions and recommendations for further studies.

CHAPTER II

REVIEW OF SELECTED LITERATURE

Correlations of the GATB with Other Tests

The Manual for the USES, General Aptitude Test Battery, Section III: Development presents data on the correlations of GATB Aptitude scores with scores on other widely used tests and interest measures. GATB aptitudes are shown to have substantial correlations with other aptitude and achievement tests which measure similar abilities; many of the correlations exceed .70. For example, the GATB Spatial Aptitude has high correlations with spatial components of the Differential Aptitude Tests. Correlations are generally low in the studies in which GATB aptitudes are correlated with interest measures; most of these correlations are near .00, and few are statistically significant. (U.S. Department of Labor, 1973)

Two correlations studies were reported with the GATB and GED. Both of these studies were done before the 1978 revision of the GED. One study reported a .67 correlation with the average GED score and the G-score (Intelligence

Aptitude) of the GATB. The correlations reported in the second study are shown in Table 3 below. (U. S. Department of Labor, 1973)

TABLE 3

CORRELATION COEFFICIENTS FOR THE GED AND GATB (N = 40)

GATB SCORES	GED Test 1	Test 2	Test 3	Test 4	Test 5	Avg. Score
G	.55	.48	.58	.60	.56	.64
V	.47	.44	.52	.64	.30	.56
N	.41	.26	.37	.24	.44	.39
S	.39	.31	.32	.39	.35	.41
P	.17	.18	.24	.20	.18	.20
Q	.39	.03	.21	.25	.02	.19
K	.47	.24	.21	.21	.14	.30
F	.03	-.02	.05	-.10	-.07	-.03
M	.05	-.01	.07	-.10	.05	-.02

The Effects of Training

Some believe that aptitudes such as those measured by the GATB are acquired or improved by specific academic training. Some studies have been undertaken to determine the influence of training on the aptitude test scores made by college students. The first such study was conducted by

Senior in 1952 and was designed to determine the effect of four years of college training on General Aptitude Test Battery scores. The sample consisted of 146 students tested in the fall of 1948 and retested in the spring of 1952. The author reports that in only one instance did students show a greater increase in an area in which it might be assumed that they had had special training than did other students not having this training. This greater increase occured in the case of business majors with the highly significant increase on the N - scale (Numerical Aptitude). (U. S. Department of Labor, 1973)

Another study by Metzner was conducted with the GATB to determine the influence of training in particular college courses on Verbal and Numerical Aptitudes. The sample in this study was divided into two experimental and two control groups. The experimental group consisted of 30 students enrolled in two selected courses in the English department of George Washington University and sixty-six students enrolled in the college algebra course at the same university. These groups were considered, respectively, as the experimental "Verbal" and "Numerical" groups. The control sample for each of the experimental groups consisted of eighty-one students enrolled in the elementary psychology course but not enrolled in the courses used for selecting the experimental groups. All students were given the GATB tests during the first week of the spring semester in 1950 and again during the final week

of the spring semester, which was approximately three and one-half months after the initial testing. The results of this study indicated that training in college algebra significantly affected the performance of the students on the numerical computation test, but the results with the numerical reasoning test were inconclusive. With reference to the influence of courses in the English department on Verbal Aptitude test performance, it could not be concluded that training affected the experimental group's performance. (U. S. Department of Labor, 1973)

Studies Relating the GED to the GATB

The GED underwent a major revision in 1978. Prior to the test's revision there were four studies done that investigated the relationship between the GATB and the GED. Each of these studies has been reviewed briefly below.

The Montgomery Study

The study conducted by Montgomery was done from 1956 to 1967 in Missouri. Using a sample of 64 individuals, Montgomery reported that persons scoring 108+ on G-Scale (Intelligence Aptitude) and 104+ on V-Scale (Verbal Aptitude) could probably pass the GED without additional preparation; those scoring between 90 and 107 on the Intelligence Aptitude Scale or between 90 and 103 on the Verbal Aptitude Scale could probably pass with additional preparation; those individuals scoring below 90 on the Intelligence Aptitude

Scale or Verbal Aptitude Scale might have difficulty passing the GED even with additional preparation. Pearson product-moment correlations were reported for the GATB cognitive aptitudes G (Intelligence Aptitude), V (Verbal Aptitude), N (Numerical Aptitude), and S (Spacial Aptitude) and the GED tests. (See Table 4). It should be noted that in Missouri at the time of this research, a standard score of 43 on each test of the GED and a total standard score of 240 (average of 48 on the five tests) were required for passage and the issuance of the equivalency certificate. (Montgomery, 1967)

TABLE 4

CORRELATION COEFFICIENT OF GATB WITH TESTS OF GED FROM THE MONTGOMERY STUDY N = 64

GATB Subtests	GED Test 1	Test 2	Test 3	Test 4	Test 5
G factor	.73	.84	.76	.79	.72
V factor	.73	.82	.76	.79	.71
N factor	.33	.48	.45	.34	.36
S factor	.52	.71	.68	.66	.65

The Brenna Study

In Wisconsin, Brenna examined a sample of 55 individuals who took the GATB and the GED tests during the period from 1962 to 1968. Comparisons of the nine GATB and five GED subscores resulted in significant correlations of the

GED subtests and average score with the GATB aptitudes G (Intelligence Aptitude), V (Verbal Aptitude), N (Numerical Aptitude), and S (Spacial Aptitude). See Table 5.

Brenna found, as did Montgomery, that G (Intelligence Aptitude) and V (Verbal Aptitude) were the best predictors of GED performance. This study reported further that applicants who score 85-89 on the G or V subtests can expect approximately a 50 percent chance of passing the GED in Wisconsin. (Wisconsin's requirement at the time of this study was an average standard score of 45 and minimum individual test standard score of 35). The higher the G and V score, the greater the probability of passing. (Brenna, 1969)

TABLE 5

CORRELATION COEFFICIENTS OF GATB WITH TESTS OF GED FROM THE BRENNA STUDY
N = 40

GATB Subtests	GED Test 1	Test 2	Test 3	Test 4	Test 5	Avg.
G	.55**	.48**	.58**	.60**	.56**	.64**
V	.45**	.44**	.52**	.64**	.30	.55**
N	.41**	.26	.37*	.24	.44**	.39*
S	.39*	.31*	.32*	.39*	.35*	.41**
P	.12	.18	.24	.20	.18	.20
Q	.39*	.03	.21	.25	.02	.19
K	.47*	.24	.21	.21	.14	.20
F	.03	-.02	.05	-.10	-.07	-.03
M	.05	-.01	.07	-.10	.05	-.02

**Significant at the .01 level
* Siginficant at the .05 level

The Klein and Trione Study

The GATB G-score (Intelligence Aptitude) was used for GED prediction in a study conducted in 1965 to 1966 by Klein and Trione in Nevada. Correlations between the G score of the GATB and the average standard score of the GED was found to be .67 for a sample of 92. An expectancy table was constructed that would predict by interval standard GED scores. This table is presented in Table 6.

Results from this study showed that a G score of less than 90 indicated that considerable preparation was necessary before taking the GED; a G score of 90 to 109 indicated optimum probability of passing the GED. (Klein and Trione, 1970)

TABLE 6

EXPECTANCY TABLE CONSTRUCTED TO PREDICT SUCCESS ON THE GED FROM THE KLEIN AND TRIONE STUDY (N = 92)

GATB "G"	Percentile	GED
145	99	64.8
141	98	64.1
129	96	62.8
125	93	61.8
120	89	59.5
116	84	57.5
110	77	55.6
107	69	53.8
104	60	52.4
100	50	50.8
97	40	49.2
94	31	47.6
92	23	46.4
90	16	45.3
79	11	44.5

The Covington, Trimmer and Klein Study

Covington, Trimmer, and Klein included only seven GATB aptitudes and the five tests of the GED in their study of 186 individuals in Minnesota. The manipulative aptitude F (Finger Dexterity) and M (Manual Dexterity) were not used in the study because reported research showed that they did not have significant correlations with GED results. Correlation coefficients were reported for the seven selected subtests of the GATB and the GED. See Table 7. These correlations generally agreed with the correlations found in previously reported studies, being slightly higher than those in the Brenna Study and slightly lower than those of the Montgomery study. All correlations indicated that aptitudes G (Intelligence Aptitude) and V (Verbal Aptitude) had the highest degree of relationship with the GED.

TABLE 7

CORRELATION COEFFICIENTS FOR THE GATB AND THE GED FROM THE COVINGTON, TRIMMER AND KLEIN STUDY (N = 186)

GATB Aptitudes	GED Test 1	Test 2	Test 3	Test 4	Test 5	Avg.
G	.465**	.513**	.546**	.505**	.603**	.612**
V	.572**	.619**	.620**	.636**	.526**	.695**
N	.362**	.281**	.363**	.306**	.522**	.423**
S	.121**	.263	.301**	.234**	.358**	.298**
P	.239**	.167*	.272**	.239**	.352**	.295**
Q	.354**	.182*	.258**	.267**	.365**	.328**
K	.189*	.034	.115	.118	.166*	.140

*Significant at the .05 level
**Significant at the .01 level

Multiple cutoff norms were developed to predict passage of the GED using the Minnesota requirements (average score of 45 on the five tests with no individual test standard score lower than 35). The optimum cutoff norms were found to be 90 on the G scale (Intelligence Aptitude), 85 on the V scale (Verbal Aptitude), and 95 on the Q scale (Clerical Perception Aptitude).

These multiple cutoff norms were investigated in terms of their predictive efficiency by using the GED requirements of Missouri (average score of 48 on the five tests and no individual standard score lower than 43). Although some success in predicting passage of the GED was reported, it was warned that caution should be exercised in the process. (Covington, 1978)

Related Studies

The Musgrove and Musgrove Study

In this study 78 participants, aged 16 to 62, were given the General Education Performance Index (GEPI), and the revised GED. The GEPI is a battery of five tests structured similarly to the GED. The GEPI is used in many GED preparation classes to give students practice for taking the GED and to diagnose weaknesses. Multiple regression equations were generated to predict GED scores using age and each GEPI score. No siginficant correlation was found between age and GED scores, but a highly significant correlation (p .001) was

found between each GEPI subtest and the subsequent scores attained on the GED. Regression equations for each subtest and cross validation that demonstrated high predictive validity for each regression equation are shown below. (Musgrove, 1979)

TABLE 8

REGRESSION EQUATIONS GENERATED BY THE MUSGROVE AND MUSGROVE STUDY (N = 78)

Subtest	Regression Equation	$SE_{r3.12}$
English	21.02 + .06 (X) + .54(Y)	±5.48
Literature	29.66 + .08 (X) + .43(Y)	±5.72
Math	29.51 + .08 (X) + .38(Y)	±4.97
Social Studies*	27.55 + .48 (Y)	±5.34
Science	21.94 + .10 (X) + .56(Y)	±5.46
Average*	13.59 + .74 (Y)	±3.54

X = age
Y = GEPI subtest standard score
* = age did not contribute

Summary

A review of the literature showed a great number of studies related to the GATB, but very few that related to the revised GED. Four studies were found that used the GATB as a predictor of success for the GED. All four of these studies were done prior to the 1978 revision of the GED, and their

validity may now be suspect. The two studies done by Montgomery and Brenna both used G, V, and N scores of the GATB as predictors. Klein and Trione in the third study used only the G score. Covington, in the fourth study, used G, V, and Q scores. All of these studies reported that individuals who scored less than 90 on subparts of the GATB would need considerable preparation before passing the GED.

CHAPTER III

METHODOLOGICAL PROCEDURES

Population of the Study

In July 1978, Oklahoma County CETA, in conjunction with Oscar Rose Junior College, initiated a General Education Development Preparation class for CETA participants. 358 people, age 17 to 63, had participated in the program. The number of years of formal education for those participating in the program ranged from seven to eleven years. Of the number who began the program, 188 completed the General Education Development Test with a passing score, ten failed the test, 122 dropped out of the program before completion, and thirty-eight were still in the program. The population of this study was the 188 participants who took the General Education Development Test and passed.

Description of the Sample

The sample for this study was one hundred of the 188 participants who took the GED and passed. Eighty-seven females, age seventeen to fifty-three, and thirteen males, age eighteen to twenty-three, were included in the sample.

The number of years of formal education completed by participants ranged from eight to eleven years, the mean was 9.6, with a standard deviation of 2.03. The mean age was 24.34 years, standard deviation 8.37.

Instrumentation

The General Education Development Test

The General Education Development Test (GED) is a battery of five comprehensive examinations in the areas of English, Social Studies, Natural Science, Literature, and Mathematics. The guidelines for the design of the GED tests are developed by the General Educational Development Testing Service under the direction and supervision of the American Council of Education. Under a contractual arrangement, the actual test is contructed by the Educational Testing Service. (The General Education Development Testing Services of the American Council of Education, 1979)

The Commission on Educational Credit and Credentials is the policy making and advisory body of the GED Testing Service and is responsible for the administrative supervision of the GED Testing Service. Official GED Testing Centers operate under the joint jurisdiction of state departments of education and the GED Testing Service. Each state sets its own policies regarding the issuance of high school equivalency certificates, and the requirements which adult residents must meet in order to take the tests and earn a certificate. (The

General Education Development Testing Services of the American Council on Education, 1978)

For guidance only, the Commissioner has made the recommendation that score requirements should be set no lower than the requirement that candidates earn either no standard score lower than 35 or an average standard score that is at least 45 (referred to hereafter as 35 or 45). Current state minimum requirements vary, but most can be referred to as

(1) 35 or 45;
(2) 40 or 45;
(3) 35 and 45; or
(4) 40 and 45.

Programs using the first requirement grant an equivalency certificate to any candidate whose lowest standard score is 35 or higher; if a candidate's lowest score is below 35, a certificate is granted if the person's average standard score is at least 45. Programs using requirement three would not grant a certificate unless both requirements were met. (The GED Test Service of the American Council on Education, 1978) Appendix A shows the minimum GED requirements for each state.

There are five tests in the GED battery. Descriptions of each of the five tests follow:

> Test 1: Writing Skills (80 items, 60 minute time limit) The questions on the Writing Skills Test are intended to measure a candidate's ability to use Standard English clearly and effectively. The test questions are drawn from five general categories: Spelling, Punctuation, Capitalization, (25%), Usage (30%), Sentence Correction (30%), and Logic and Organization (15%).

Test 2: Social Studies (60 items, 90 minute time limit) The Social Studies Test includes questions on history, economics, geography, political science, and behavorial science. However, no single form of the test includes all the elements of any of these subjects. The questions on the tests are selected from the broad group of topics listed under each major subject area of: U.S. History (25%), Economics (20%), Geography (15%), Political Science (20%), and Behavorial Science (20%).

Test 3: Science (60 items, 90 minute time limit) The Science Test covers various subjects in Biology, (50%), Earth Science (20%), Chemistry (15%), and Physics (15%). No single examination attempts to cover all the topics in each major category.

Test 4: Reading Skills (40 items, 60 minute time limit) Each question in the Reading Skills Test is based on a written passage. One or more questions follow each passage; the answer to each question in the set can be determined without answering other questions correctly. The passages are drawn from a wide range of reading materials that have been classified into five areas: Practical Reading (15%), General Reading (30%), Prose Literature (30%), Poetry (12%), and Drama (12%).

Test 5: Mathematics (50 items, 60 minute time limit) The following is a list of the mathematics topics in the GED Mathematics Tests: Arithmetic (55%), Geometry (20%), and Algebra (25%). (The GED Testing Service of the American Council on Education, 1979)

The General Aptitude Test Battery

The General Aptitude Test Battery was developed by the United States Employment Service and has been used since 1947 by State employment service offices. Since that time, the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base, the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance. (U. S. Department of Labor, 1973)

The GATB is composed of twelve tests selected because they are good measures of nine aptitudes found to be important for successful performance in a wide variety of occupations. Of the twelve tests, eight are paper and pencil tests; two are apparatus tests involving the use of peg boards; and two involve the use of Finger Dexterity Boards. The twelve tests are described below. The aptitude or aptitudes measured by each test follow each definition. (U. S. Department of Labor, 1973)

> Part 1 - Name Comparison. This test consists of two columns of names. The examinee inspects each pair of names, one in each column, and indicates whether the names are the same or different. Measures Clerical Perception.
>
> Part 2 - Computation. This test consists of a number of arithmetic exercises requiring the addition, subtraction, multiplication, or division of whole numbers. Measures Numerical Aptitude.
>
> Part 3 - Three-Dimensional Space. This test consists of a series of exercises containing a stimulus figure and four drawings of three-dimensional objects. The stimulus figure is pictured as a flat piece of metal which is to be either bent, or rolled, or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which one of the four drawings of three-dimensional objects can be made from the stimulus figure. Measures Intelligence and Spatial Aptitude.
>
> Part 4 - Vocabulary. This test consists of sets of four words. The examinee indicates which two words have either the same or opposite meanings. Measures Intelligence and Verbal Aptitude.
>
> Part 5 - Tool Matching. This test consists of a series of exercises containing a stimulus drawing and four black-and-white drawings of simple shop tools. The examinee indicates which of the four black-and-white drawings is the same as the stimulus drawing. Variations exist only in the distribution of black and white in each drawing. Measures Form Perception.

Part 6 - Arithmetic Reason. This test consists of a number of arithmetic problems expressed verbally. Measures Intelligence and Numerical Aptitude.

Part 7 - Form Matching. This test consists of two groups of variously shaped line drawings. The examinee indicates which figure in the second group is exactly the same size and shape as each figure in the first or stimulus group. Measures Form Perception.

Part 8 - Mark Making. This test consists of a series of squares in which the examinee is to make three pencil marks, working as rapidly as possible. The marks to be made are short lines, two vertical and the third a horizontal line beneath them. Measures Motor Coordination.

Part 9 - Place. The equipment used for this test and for Part 10 consists of a rectangular pegboard divided into two sections, each section containing 48 holes. The upper section contains 48 cylindrical pegs. The examinee removes the pegs from the holes in the upper part of the board and inserts them in the corresponding holes in the lower part of the board, moving two pegs simultaneously, one in each hand. This performance is done three times, with the examinee working rapidly to move as many of the pegs as possible during the time allowed for each of the three trials. Measures Manual Dexterity.

Part 10 - Turn. The equipment described under Part 9 is also used for this test. For Part 10 the lower section of the board contains the 48 cylindrical pegs. The examinee removes a wooden peg from a hole, turns the peg over so that the opposite end is up, and returns the peg to the hole from which it was taken, using only his preferred hand. The examinee works rapidly to turn and replace as many of the 48 cylindrical pegs as possible during the time allowed. Three trials are given for this performance. Measures Manual Dexterity.

Part 11 - Assemble. The equipment used for this test and for Part 12 consists of a small rectangular board (Finger Dexterity Board) containing 50 holes and a supply of small metal rivets and washers. The examinee takes a small metal rivet from a hole in the upper part of the board with his preferred hand and at the same time removes a small metal washer from a vertical rod with the other hand; examinee puts the washer on the rivet and inserts the assembled piece into the corresponding hole in the lower part of the board using

only his preferred hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.

Part 12 - Disassemble. The equipment used for this test is the same as that described for Part 11. The examinee removes the small metal rivet of the assembly from a hole in the lower part of the board, slides the washer to the bottom of the board, puts the washer on the rod with one hand and the rivet into the corresponding hole in the upper part of the board with the other (preferred) hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity. (U. S. Department of Labor, 1973)

Scores from these twelve tests are combined to produce the nine aptitudes measured by the GATB. These are defined below. The letter used as the symbol to identify each aptitude precedes each aptitude name. The test or tests of the GATB measuring each aptitude follow each definition. The aptitude definitions are based on factor analysis studies; hence, some of the aptitude definitions do not correspond exactly to the definitions of the test or tests which measure them. The definitions describe the factor being measured rather than the specific test or tests chosen to represent the factor.

Aptitude G - Intelligence. General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school. Measured by Parts 3, 4, and 6.

Aptitude V - Verbal Aptitude. The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. Measured by Part 4.

Aptitude N - Numerical. Ability to perform arithmetic operations quickly and accurately. Measured by Parts 2 and 6.

Aptitude S - Spacial Aptitude. Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space. Measured by Part 3.

Aptitude P - Form Perception. Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines. Measured by Parts 5 and 7.

Aptitude Q - Clerical Perception. Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception which is required in many industrial jobs even when the job does not have verbal or numerical content. Measured by Part 1.

Aptitude K - Motor Coordination. Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Measured by Part 8.

Aptitude F - Finger Dexterity. Ability to move the fingers, and manipulate small objects with the fingers, rapidly or accurately. Measured by Parts 11 and 12.

Aptitude M - Manual Dexterity. Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions. Measured by parts 9 and 10. (U. S. Department of Labor, 1973)

Data Acquisition

Participants of this study had been given the GATB prior to entering the GED Preparation Program. Starting in January, 1980, GATB scores were forwarded to the GED program

office from the CETA office. Each of the nine GATB scores was recorded on a master sheet, and as participants passed the GED, the five GED scores, the average GED score, the age of the participant at the time of testing, the number of hours spent in the program, and the last grade completed by the participant were added to the master sheet.

Treatment of the Data

When 100 participants had profiles with all of the required information and test scores, their five subscores of the GED, average GED score, nine GATB scores were placed on data cards. The age of each participant, the number of hours each had been in the program, the age at the time of testing, and the last grade completed were also put on the cards. These cards were verified when they were key punched, and again before the statistical analysis was done.

All data processing was done on the University of Oklahoma's IBM-360 computer using the Statistical Analysis System (SAS) program package. (Barr, Goodnight, Sall, Blair, and Chilko, 1979). The CORR Procedure was used to compute Pearson product-moment correlations between GATB scores and GED scores. This procedure also yielded for each variable the mean, standard deviation, the minimum, the maximum, and the sum. For each pair of variables, the CORR Procedure printed the Pearson correlation coefficient, and the significance probability of the correlation.

The SAS Stepwise procedure with the maximum R-square technique was used to generate regression equations for (1) each of the five subtests of the GED; (2) the average GED score; (3) the number of hours needed to participate in a preparation program. Significant level for entry into the model was set at .50, and the significant level for staying in the model was set at .10.

Summary

Chapter 3 describes the methodology employed in this study. The population of the study was 188 participants of a CETA-GED preparation program who took and passed the GED. The sample consisted of 100 of the 188 participants. Description of the General Education Development Test and the General Aptitude Test Battery were given. The Stepwise procedure with maximum R-square technique from the SAS package was used to generate the regression equations.

CHAPTER IV

FINDINGS

Analysis of the Data

The purpose of this study was to determine if scores from the General Aptitute Test Battery could be used to predict scores on the General Education Development Test. A second purpose was to determine if aptitude scores on the General Aptitude Test Battery could be used in a regression equation that would predict the number of hours of preparation a client would need before passing the General Education Development Test.

Analysis of the data was begun with computation of means and standard deviations for all the variables in the study for informational purposes. Mean scores for the five subtests of the GED ranged from 50.21 to 55.26; the mean for the average GED score was 52.55. These results were slightly higher than 50, the standardized mean for the GED. Standard deviations for the five subtests ranged from 4.45 to 6.39; the standard deviation for the average GED score was 4.37. These results were lower than the reported standard deviation

of 10 for the GED. The mean for the number of hours spent in the program was 237.96 with a standard deviation of 104.57. These results are shown in detail in Table 9.

TABLE 9

MEAN SCORES, STANDARD DEVIATIONS, MINIMUM AND MAXIMUM SCORES (N = 100)

	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
GED 1	51.20	5.614	40	69
GED 2	52.84	5.416	42	65
GED 3	53.32	5.140	42	67
GED 4	55.26	6.389	44	78
GED 5	50.21	4.452	40	62
AVG.GED	52.55	4.374	45.2	66.0
Hours	237.96	104.571	37	506

The next computation involved examining the correlation between the GATB aptitudes, the GED scores, and the hours spent in the preparation of the program. The G score (Intelligence Aptitude) and the V score (Verbal Aptitude) had the highest correlations with tests of the GED. These correlations ranged from 0.6414 to 0.3287; all were significant at the 0.0001 level. The N score (Numerical Aptitude) had significant correlations (at .05 level or better) with GED tests I, II, IV, V, and with the average GED score. The

S score (Space Relations) had significant correlations (at the .05 level or better) with GED tests II, III, IV, V, and with the average GED scores; P (Form Perception) had significant correlations (at the .05 level or better) with GED tests I, II, and with the average GED scores; and Q (Clerical Perception) had significant correlations (at the .05 level or better) with I. These results are shown below in Table 10.

TABLE 10

CORRELATION COEFFICIENTS WITH CORRESPONDING LEVELS OF SIGNIFICANCE FOR GED AND HOURS WITH GATB SCORES (N=100)

	GED 1	GED 2	GED 3	GED 4	GED 5	AVG. GED	HOURS
G	0.4892	0.4347	0.4830	0.3727	0.4638	-0.5506	-0.4608
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
V	0.6327	0.6062	0.5179	0.4904	0.3287	0.6414	-0.3861
	0.0001	0.0001	0.0001	0.0001	0.0008	0.0001	0.0001
N	0.4285	0.2784	0.2384	0.1990	0.3682	0.3658	-0.4622
	0.0001	0.0050	0.0169	0.0472	0.0002	0.0002	0.0001
S	0.1713	0.1989	0.3911	0.2139	0.3002	0.3129	-0.1800
	0.0883	0.0473	0.0001	0.0326	0.0024	0.0015	0.0731
P	0.3176	0.0784	0.2413	0.0913	0.1137	0.2037	-0.4595
	0.0013	0.4379	0.0156	0.3664	0.2602	0.0421	0.0001
Q	0.2335	0.1046	0.1267	0.0837	0.0319	0.1433	-0.3187
	0.0194	0.3002	0.2092	0.4077	0.7524	0.1550	0.0012
K	0.1120	-0.0454	0.0432	0.0163	-0.0750	0.0138	-0.0221
	0.2675	0.6542	0.6697	0.8719	0.4581	0.8915	0.8274
F	0.0801	0.0630	0.1845	0.0600	-0.0177	0.0927	-0.2173
	0.4284	0.5335	0.0662	0.5530	0.8609	0.3591	0.0299
M	0.1759	0.0506	0.1089	0.1138	0.0938	0.1341	-0.1329
	0.0800	0.6173	0.2806	0.2597	0.3535	0.1834	0.1874

Regression equations were generated as the final phase of the data analysis. Two equations are reported for each of the dependent variables. Other equations were found in the data analysis, some using as many as nine variables. These, however, were not reported since the addition of other variables did not contribute to the predictive efficiency of the equations. Those equations reported here were the most parsimonious. Standard errors for the regression equations were also calculated. These are shown below in Table 11.

TABLE 11

REGRESSION EQUATIONS AND CORRESPONDING STANDARD ERRORS OF REGRESSION

GED I	Writing Skills	
	=21.21 + .31 (V)	SE = ± 4.31
	=16.10 + .27 (V) + .10(N)	SE = ± 4.18
GED II	Social Studies	
	=24.86 + .29 (V)	SE = ± 4.30
	=27.65 + .32 (V) - .05(M)	SE = ± 4.23
GED III	Science	
	=30.63 + .24 (V)	SE = ± 4.39
	=23.90 + .21 (V) + .10(S)	SE = ± 4.18
GED IV	Reading Skills	
	=28.55 + .27 (V)	SE = ± 5.57
	=31.98 + .30 (V) - .05(Q)	SE = ± 5.53
GED V	Mathematics	
	=31.95 + .19 (G)	SE = ± 3.93
	=33.35 + .24 (G) - .06(P)	SE = ± 3.85
Average GED Score		
	=28.64 + .25 (V)	SE = ± 3.36
	=25.19 + .23 (V) + .05(S)	SE = ± 3.27
Hours	=638.86 - 4.28 (N)	SE = ± 93
	=725.91 - 2.95 (N) - 1.86(P)	SE = ± 88

Comparisons With Other Studies

The Montgomery Study

The GED and GATB correlations reported by Montgomery (1967) were higher than those found in this study; in some cases Montgomery's were as much as .42 higher. Mongtomery concluded the following: that persons scoring 108+ on the G-scale (Intelligence Aptitude) could probably pass the GED without additional preparation; that those scoring 90 to 103 on the Verbal Aptitude scale and 90 to 107 on the Intelligence scale could probably pass with additional preparation; that those individuals scoring below 90 on the Intelligence Aptitude scale or on the Verbal scale might have some difficulty passing the GED even with additional preparation.

Since the regression equation for predicting GED average scores reported in this study used the V score, a comparison between this study and Montgomery's findings was made. According to equations generated by this study, a V score of 104 would yield a predicted average GED score of 54.64 ± 3.36 (a score between 58.00 and 51.28). This predicted score is well above the requirement set by state departments of education for passing the GED.

A V score of 103 would yield a predicted average GED score of 54.39 ± 3.36 (a score between 57.75 and 51.03). A V score of 90 would yield a predicted score of 51.14 ± 3.36 (a score between 54.50 and 47.78). These predicted

scores are also above the requirements set by most state departments of education for passing the GED. The results of this study verify Montgomery's results but slightly modify the values he developed.

The Brenna Study

The correlations reported in the Brenna study (1969) are also higher than those found in this study. The differences were not as great, however, as they were in the Montgomery study. Brenna reported that applicants who scored 85-89 on the V scale (Verbal Aptitude) could expect approximately a 50 percent chance of passing the GED, and that the higher the V-score the greater the probability of passing. According to this study a V score of 85 would yield a predicted average GED score of 49.89 ± 3.36 (a score between 53.25 and 46.53). These predicted scores would meet the requirements set by most state departments of education for passing the GED.

The Klein and Trione Study

Klein and Trione (1970) used only the G score (Intelligence Aptitude) to predict performance on the GED. Comparisons cannot be made between the Klein and Trione data and this study since the regression equation generated by this study to predict average GED scores uses either V scores alone or V and S scores.

The Covington, Trimmer and Klein Study

Covington, Trimmer and Klein (1978) reported correlation coefficients for the GED and GATB that were also higher than those found in this study. They reported the optimum cutoff norms on the V scale to be 85, which would yield a predicted average GED score of 49.89 ± 3.36 (a score between 53.25 and 46.53).

Summary

This chapter presented the findings of the data analysis done in this study. Mean scores for the GED tests ranged from 50.21 to 55.26; standard deviations ranged from 4.45 to 6.39. These descriptive statistics are similar to the national norms for the GED of mean equals 50, and standard deviation equals 10, respectively.

Correlations coefficients for the GED and GATB were also reported. The correlations of the Verbal and Intelligence Aptitude scores of the GATB with the GED scores were highest, with levels of significance at 0.0001.

Regression equations for each of the GED subtests, the GED average score, and the number of hours in the program were reported next. These equations used one and two independent variables, respectively.

Finally, a comparison of this study's findings and the findings of studies reported in Chapter II was made. The earlier studies, all done before the major revision in 1978

of the GED, reported using G-scores (Intelligence Aptitude) and V-scores (Verbal Aptitude) to predict success on the GED. This study reported using V-scores in five of the six regression equations and the G-score in only one equation.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Census figures show that there are over forty-eight million Americans who have not completed four years of high school. (U.S. Bureau of the Census, 1979) In many cases individuals who have not completed high school experience difficulty securing satisfactory employment and turn to social agencies for assistance. Many of these agencies assess their clients' aptitudes by administering the General Aptitude Test Battery. This test, developed by the United States Employment Service, is used extensively by employment counselors to determine for what types of jobs or training a client is best suited.

In some cases dropouts who are selected to train for jobs that require a high school diploma or its equivalent are placed in classes designed to help the client prepare for the General Education Development Test. Those who pass this test receive a high school equivalency certificate which is recognized as the equal to a high school diploma.

Purpose

The purpose of this study was to determine the relationship between test scores on the General Education Development Test and the General Aptitude Test Battery. More specifically, it has generated regression equations that predict (1) scores on each of the five subtests of the GED, (2) an average GED score, and (3) the number of hours an individual should participate in a GED preparation class before taking the GED.

Description of the Sample

The sample was drawn from a GED preparation class that was sponsored by Oklahoma County CETA and Oscar Rose Junior College. It consisted of one hundred individuals who had participated in the preparation program and had passed the GED. The age of the participants ranged from seventeen to sixty-one, the mean age being 24.97. The number of years of formal education ranged from seven to eleven years, the mean being 9.59 years.

Procedure

Individuals entering the GED preparation program had been given the GATB. After they had successfully completed the GED preparation program and had passed the GED test, their GED test scores, their GATB aptitude scores, and the number of hours they had participated in the program were recorded on data cards. Using the Statistical Analysis System, Pearson

product-moment correlations between the GATB scores and the GED scores were found. Then, using the Stepwise procedure with maximum R-square technique, regression equations were generated for (1) each of the five subtests of the GED; (2) the average GED score; and (3) the number of hours needed to participate in a preparation program.

Summary of Findings

Two equations were found for each of the dependent variables. Standard errors of regression were also calculated. These equations are shown below with the corresponding standard error. All equations were found to be significant at the 0.0001 level.

GED I	Writing Skills	
	=21.21 + .31 (V)	SE = ± 4.31
	=16.10 + .27 (V) + .10(N)	SE = ± 4.18
GED II	Social Studies	
	=24.86 + .29 (V)	SE = ± 4.30
	=27.65 + .32 (V) - .05(M)	SE = ± 4.23
GED III	Science	
	=30.63 + .24 (V)	SE = ± 4.39
	=23.90 + .21 (V) + .10(S)	SE = ± 4.18
GED IV	Reading Skills	
	=28.55 + .27 (V)	SE = ± 5.57
	=31.98 + .30 (V) - .05(Q)	SE = ± 5.53
GED V	Mathematics	
	=31.95 + .19 (G)	SE = ± 3.93
	=33.35 + .24 (G) - .06(P)	SE = ± 3.85
Average GED Score		
	=28.64 + .25 (V)	SE = ± 3.36
	=25.19 + .23 (V) + .05(S)	SE = ± 3.27
Hours	=638.86 - 4.28 (N)	SE = ± 93
	=725.91 - 2.95 (N) - 1.86(P)	SE = ± 88

Conclusions

The relationship between the scores on the GATB and the scores on the GED were significant according to the results of this study. Some GATB scores can be used to predict GED scores. The application of the multiple regression equations developed to predict each GED score from specified GATB scores appears to be a viable technique to predict the performance of high school dropouts on the GED.

The utilization of the regression equation is straightforward and the GED score may be predicted quickly either by using a simple hand calculator or by longhand computation. In each regression equation the specified GATB score of a student is substituted into the equation. The equation is then simplified to yield the predicted GED score. For example:

Client's GATB scores: V=102 and S=98

Regression Equation for average GED score:
Avg. GED' = 25.19 + .23(V) + .05(S)

Substituting 102 for V and 98 for S:

Avg. GED' = 25.19 + .23(102) + .05(98)
= 25.19 + 23.46 + 4.90
= 53.55

Considering the standard error, it can be predicted that the client's average GED score would be 53.55 ± 3.27 or between 50.28 and 58.82.

In every equation, except the equation for GED Test V, the mathematics test, the V score (Verbal Aptitude) was used to predict GED scores. This suggests that the Verbal Aptitude is the best single predictor of success for the GED.

The regression equations generated by this study to predict the number of hours of study a participant would need in order to pass the GED used the numerical aptitude score. (HRS' = 638.86-4.28(N)). From this equation it can be concluded that those with high numerical aptitude scores are predicted to finish a GED preparation class faster than those with lower numerical aptitude scores.

Recommendations

This study did not deal with the age of the participants or the last grade completed by participants; nor did it look into the differences between scores distinguished by the sex of the participants. Thus, there are three recommendations for future studies:

1. It is recommended that a study be conducted to determine if the age of a participant could be used in conjunction with GATB scores to determine scores on the GED.

2. It is recommended that a study be conducted to determine if the last grade of school completed by the participant could be used in conjunction with GATB scores to determine scores on the GED.

3. It is recommended that a study be conducted to determine if the scores of men differ significantly from those of women when using GATB scores to predict success on the GED.

APPENDIX A

INDIVIDUAL STATE REQUIREMENTS FOR ISSUANCE OF GED CERTIFICATE

State	Required Standard Score
Alabama	35 or 45
Alaska	35 or 45
Arizona	35 and 225
Arkansas	35 and 45
California	35 and 45
Colorado	35 and 45
Connecticut	35 and 45
Delaware	40 and 45
District of Columbia	35 and 45
Florida	40 and 45
Georgia	35 and 45
Hawaii	35 and 45
Idaho	35 and 45
Illinois	35 and 45
Indiana	35 and 45
Iowa	35 and 45
Kansas	35 and 45
Kentucky	35 and 45
Louisiana	35 or 45
Maine	35 and 45
Maryland	40 and 45
Massachusetts	35 and 45
Michigan	35 and 45
Minnesota	35 and 45
Mississippi	40 or 45
Missouri	35 and 45
Montana	35 or 45
Nebraska	40 or 45
Nevada	35 and 45
New Hampshire	35 and 45
New Jersey	35 and 255 total score 270 for Spanish speaking examinees
New Mexico	40 or 50
New York	35 and 45
North Carolina	35 and 255 total score
North Dakota	40 or 50
Ohio	35 and 45
Oklahoma	35 and 45
Oregon	40
Pennsylvania	35 and 45
Rhode Island	35 and 45
South Carolina	45
South Dakota	35 or 45
Tennessee	an average score of not less than 45 on all five tests

State	Required Standard Score
Texas	40 or 45
Utah	40 and 45
Vermont	35 and 45
Virginia	35 and 45
Washington	35 and 45
West Virginia	35 or 45
Wisconsin	35 and 45
Wyoming	35 and 45

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